

**Quality Assurance Project Plan for  
Qualitative Freshwater Mussel Surveys  
and  
Mussel Habitat Characterizations**

**Beneficial Use Impairment Advancements  
For the Massena/Akwesasne Area of Concern  
On the St. Lawrence River.  
GL-97221310-0**

**AMENDMENT  
August 2013**

**ORIGINAL APPROVED QAPP  
August 2012  
January 2013 Revised Final**

**Prepared for**

St. Regis Mohawk Tribe  
Environment Division  
Akwesasne, 13655  
and  
U.S. Environmental Protection Agency Region 2 and  
Great Lakes National Program Office

**Prepared by**

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## Quality Assurance Project Plan Title and Approval Sheet

Project title:                   Qualitative Freshwater Mussel Survey and Mussel Habitat  
Characterization                   in the St. Lawrence River Area of Concern  
  
  Massena/Akwesasne AOC St. Lawrence River - BUI Advancement

Prepared by:                   Riveredge Associates, LLC, Massena, New York 13662

Project Initiation:                   September 17, 2012  
Project Termination:                   September 30, 2014

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Elizabeth VanRabenswaay, Project Officer, USEPA Region 2	Date
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**QAPP AMENDMENT**  
**submitted August 2013**  
**to the**  
**Quality Assurance Project Plan for**  
**Qualitative Freshwater Mussel Survey and**  
**Mussel Habitat Characterization**  
**in the St. Lawrence River Area of Concern**

This amendment is being submitted to update and revise the 2012 methodologies used in the approved Quality Assurance Project Plan for Qualitative Freshwater Mussel Survey and Mussel Habitat Characterization in the St. Lawrence River Area of Concern for continued sampling in 2013. This amendment also documents changes in staff working on this project.

The overall goals and objectives of this project have not changed. Results obtained from 2012 field surveys will be used for additional 2013 field work. This document records the amended procedures for 2013.

Specifically, the 2012 QAPP suggested 2013 field work would include quantitative sampling. This has been replaced with semi-quantitative sampling using timed searches, very similar to 2012 methodologies. During these timed searches, additional data, such as mussel age, will be collected in 2013.

One new approach for 2013 surveys is to select some of the inside AOC and outside AOC sites based on previous work 15-20 years ago (Erickson and Fetterman 1996, Erickson unpublished data) to determine if the population metrics (species, size, age) of freshwater mussels have changed over time. These data will assist with the determination of whether or not freshwater mussels are successfully reproducing inside and outside the AOC.

In addition to this QAPP Amendment for the field surveys, a separate QAPP has been prepared for the collection of contaminant samples in 2013 ("*Quality Assurance Project Plan for Field Collection Activities for Freshwater Mussel Contaminants In and Adjacent to the Massena/Akwesasne Area of Concern*", Riveredge Associates, August 2013, 69 pages).

## **Section 1.0 PROJECT/TASK ORGANIZATION**

### **Project Management - Changes for 2013**

#### *EPA Project Officer*

Barbara Belasco has been replaced with Elizabeth VanRabenswaay. VanRabenswaay will be responsible for providing funding and QAPP approval, and coordination with the proposed project and reporting needs.

#### *EPA QA Program*

The U.S. EPA Region 2 QA Program representative is now Kathryn Drisco (not Kathryn Seaver)

*Riveredge Associates, LLC*

Joyce Barkley-Hahn

Ms. Barkley-Hahn is not participating in this project.

J. Mark Erickson, Ph.D., Professor Emeritus, St. Lawrence University

Professor Mark Erickson will participate as a local expert on mussel identification and distribution. He will report to Lee Harper. He will provide data on mussels from these rivers that he collected approximately 15-20 years ago for comparison to current data (Erickson unpublished data).

Dive Safety Officer

The Dive Safety Officer will be Lee Harper, Laurie Harper, or a qualified designate.

## **Section 2.0 PROBLEM DEFINITION/BACKGROUND**

No Change

A separate QAPP was prepared for the contaminant assessment that will be conducted.

## **Section 3.0 PROJECT TASKS/DESCRIPTION**

2013 activities will continue to determine the presence or absence of freshwater mussels inside and outside the AOC and characterize the physical habitat of these areas during September 2013 based on the qualitative survey of systematically selected river segments conducted in 2012.

As in 2012, a timed-search survey protocol will be used as the crew conducts qualitative surveys at selected sites; collecting mussels by either wading, snorkeling, or scuba diving to obtain data on species composition and general abundance of mussel populations at these sites.

This project, as outlined in the original QAPP, will provide data comparable to a previous reports by Normandeau (2006, 2008) for the Grasse River and provide new data within the St. Regis, Raquette, and St. Lawrence rivers. Data on freshwater mussel populations will assist a determination on the “Unknown/Needs Further Assessment” Status of the *Degradation of Fish and Wildlife Populations & Degradation of Benthos* Beneficial Use Impairments (BUIs), thus making progress on BUI Advancements for the AOC.

The proposed 2013 assessment will:

1. Select sites based on 2012 qualitative habitat work
2. Conduct semi-quantitative field surveys to describe mussel abundance and richness based on timed searches
3. Determine the age, sex, length, height, and width of a subsample ( $\geq 20$  individuals) of all mussels
4. Examine mussels for evidence that they are gravid and reproducing
5. Report on the current status of mussels and their habitat inside and outside the AOC.

Quantitative mussel surveys will not be performed in 2013. Instead, an assessment of populations and reproduction will be performed by comparing 2013 data on abundance to data collected almost two decades ago through timed searches. The proposed 2013 timed search methodology will be identical to that used by Erickson (unpublished data) to provide comparative data.

To assess whether freshwater mussel populations are reproducing, field data collected regarding numbers, size, and age will be collected and compared to sites sampled by J. Mark Erickson of St. Lawrence University 15-20 years ago. If mussels are reproducing successfully, there should be an entirely new generation of individuals of many of the species that were found approximately two decades ago. This new generation would be represented by individuals that are younger than the years that have passed from the previous survey of the same site. Comparison of population metrics (species, age, size) between the two data sets should indicate whether or not a variety of ages are present, which in turn would indicate if successful reproduction had occurred over approximately two decades. A skewed ratio of older individuals to younger individuals, could suggest that reproduction is not occurring in the freshwater mussels of these rivers. The age of individual mussels can be determined by counting the annual growth rings on the outside of the shell. The width of these growth rings may vary from river to river and from year to year based on environmental conditions at the time of growth. In general, mussel growth is most rapid in the first few years and slows as the mussel gets older.

### **Work Schedule:**

#### **August 2013**

- Prepare *Amendment to QAPP for Qualitative Freshwater Mussel Surveys and Mussel Habitat Characterization*,
- Select survey sites
- Start field surveys of selected sites

#### **September 2013**

- Assessment of mussel abundance through timed-searches, including examining individuals for evidence of successful reproduction by examination of reproductive structures.

#### **January-April 2014**

- Draft *Freshwater Mussel Status Report* with new findings.

## **Section 4.0 DATA QUALITY OBJECTIVES FOR MEASUREMENT DATA**

### **Project Quality Objectives**

Project Data Quality Objectives are the same: to assess the presence/absence of freshwater mussels during river surveys to aid in later developing relative abundance index metrics to compare populations inside and outside the AOC. Freshwater mussel surveys will be conducted

to provide comparable data to existing AOC data (e.g. Normandeau 2006) and to provide new data in and near the AOC.

A new measure of mussel abundance incorporated into this amendment is the number of mussels encountered per hour (catch per unit effort or CPUE). This measure will provide comparative data with Erickson's unpublished data for the three tributary rivers inside and outside the AOC. Although Erickson does not have exact measurements and age data for all sites, we intend to sample a minimum of 14 sites, seven inside the AOC and seven outside the AOC (table below).

### **Sampling Quality Objectives**

Sampling quality objectives include determining the age, sex, and physical measurements of a minimum of 20 individuals for each species (or all individuals if less than 20 are found at a site). Age will be determined by counting the annual growth rings on the outside of the shell. The physical measurements (length, height, width) will be measured to the nearest millimeter with digital calipers. Individual mussels will be examined to determine if they are reproductive by gently prying open the valves just enough to see the gills. This will only be done if the valves can be opened slightly without causing damage to the shell margins. Marsupial gills are highly inflated and can be visually observed when the valves are separated slightly. Selected animals will be collected as voucher specimens for the New York State Museum as required by the New York State License to Collect and Possess issued for this work (NYSDEC LCP#1555).

#### *Representativeness:*

The individual mussels selected for measurement will be representative of the distribution of ages and sizes among all the mussels collected. Since the desired data include the full range of sizes and ages, the largest and smallest individuals of each species will be measured. In addition, after sorting by size and species, the remaining mussels selected for measurement and aging will be selected in approximate equal distribution through the range of sizes and ages available. This will ensure that the ages and sizes in the sample are represented in the measurements and the measurements are representative of the mussels encountered at the site.

#### *Spatial:*

The same systematic 300-m survey segments will be used to compare equal number of sites inside and outside the AOC. A minimum of 14 segments will be sampled, as proposed in Section 7.0 Sampling Process Design.

#### *Temporal:*

No change.

#### *Comparability:*

Data will be compared and reported based on CPUE: number of mussels per person hour broken down by species and total, not distribution index calculation as presented in Comparability section in 2012. This will provide comparable data to data previously collected at these sites.

The average physical size of mussels and age of mussels from each site will be compared within and between rivers and inside and outside the AOC. These data will be presented graphically, and reported for all sites inside and outside the AOC. Data acquisition methods will be identical at each site to ensure comparable data with no added bias.

*Bias:*

Mussels will be sorted by size and species on land. Mussels selected for measurement from the sorted individuals will include the smallest, largest, and a series of individuals selected between the two. The mussels selected will approximate each size or age class present. Selecting mussels in this manner ensures that the ages of mussels present will be determined. If an abundance of mussels in a single size or age class is observed, it will be noted.

*Completeness:*

Completeness will be achieved when a minimum of 14 sites are sampled. The number of sites and their relationship to the AOC are detailed in the table below.

River	Sites Outside AOC	Sites Inside AOC	Total Sites by River
St. Regis River	2	2	4
Grasse River	3	3	6
Raquette River	2	2	4
Total Sites by Location Inside or Outside AOC	7	7	14

*Sensitivity:*

The proposed timed-search methodology is sensitive enough to detect presence/absence of mussels and provide data on the relative abundance of these species for comparison among river segments. To make certain that these surveys are sensitive enough to record even rare species, the amount of search time for these surveys has been doubled from 2012 qualitative surveys. In addition, whereas some studies only measure five individual mussels, we will measure 20 individual mussels, and determine their ages. Age will be determined by counting the annual growth rings on the outside of the shell. The physical measurements (length, height, width) will be measured to the nearest millimeter with digital calipers. Individual mussels will be examined to determine if they are reproductive by gently prying open the valves just enough to see the gills. This will only be done if the valves can be opened slightly without causing damage to the shell margins. Marsupial gills are highly inflated and can be visually observed when the valves are separated slightly. Selected animals will be collected as voucher specimens for the New York State Museum as required by the New York State License to Collect and Possess issued for this work (NYSDEC LCP#1555).



## **Section 5.0 SPECIAL TRAINING REQUIREMENTS**

Erickson will train field staff to collect mussels, identify them, sort them, and measure them. Erickson will be on site for all mussel processing, and will check all field team identifications. He will oversee all aspects of field data collection.

All other Special Training Requirements as outlined in Section 5.0 of the original QAPP (Qualitative Freshwater Mussel Survey Habitat Revised Final January 2013) will still apply for 2013.

## **Section 6.0 DOCUMENTATION AND RECORDS**

No change.

## **Section 7.0 SAMPLING PROCESS DESIGN**

Sampling efforts for fall 2013 will build upon the results of the 2012 habitat sampling. 2013 sampling sites will be selected from those river segments identified in 2012 that were found to have live mussels present (table below) and from segments previously sample by Erickson.

Selected segments known to have live mussels will be searched for a minimum 1.0 person-hour timed search to provide data on what species exist. These timed-searches are the methods recommended by Strayer and Smith (2003), Riveredge (2013) and used previously by Normandeau (2008) for the Grasse River. These 2013 1.0 person-hour timed searches match the semi-quantitative surveys conducted by Normandeau (2008). This will generate comparable data to data previously collected for the Grasse River. A minimum of seven sampling sites will be inside the AOC and seven sampling sites will be outside the AOC. Priority sites will be those for which Erickson can provide data from his previous work.

Potential sampling sites for freshwater mussels inside and outside the AOC .

	River	Potential Sampling Sites Inside AOC	Potential Sampling Sites Outside the AOC (Upstream)
1	St. Regis	Segments 1, 6, 12, 14, 16	Segments 2, 4, 8, 11, 12, 16
2	Raquette	Segments 1, 6, 9, 16, 17, 31, 37, 42, 51, 52, 55, 58	Segments 1, 4, 13, 16, 34, 35, 41, 42, 43, 64
3	Grasse	Segments 7, 9, 12, 13, 16, 17, 18, 19, 21, 23, 27, 29, 31, 35, 36, 39	Segments 2, 3, 5, 7, 9, 11, 12, 13; 21, 22, 24, 29, 34, 43
4	St. Lawrence	None	None

## **Section 8.0    SAMPLING METHODS**

Sampling methods for 2013 are largely similar to that proposed in the approved 2012 QAPP but include additional data. The 2012 segment surveys focused on habitat characteristics in each river and identified segments that contained live mussels. Although the counting and measuring of five individual mussels was proposed in the QAPP, this could not be accomplished in fall 2012 before cold weather set-in. This will be done in 2013.

For 2013, in selected segments identified in 2012 as containing live mussels, all mussels encountered will be collected during a minimum one person-hour timed search. From these mussels, a subsample of each species will be measured (length, height, width) and aged to determine the age structure of the local mussel population at each site. A minimum of 20 individuals will be measured for each species. If less than 20 individuals are found for a species, then all individuals will be measured and aged.

At each site, the field team will collect all mussels encountered during the one-hour minimum timed search. Mussels will be located visually and tactilely by feeling through the substrate. Searchers will pay particular attention to small mussels that may be difficult to see visually. At the end of the search time, all mussels will be carried to shore in a bucket of river water where they will be sorted by species and by size within species. Mussels will be removed from the water for examination and photographs, but will not be held out of water so long as to cause injury. After examination, mussels will be released as close to the point of collection as possible. The overall collection of mussels will be documented with a photograph. Additional detailed photographs may be taken to record species encountered at each site. If a species cannot be positively identified by observation of external characters, it may, if necessary, be opened to confirm species identity through internal characters if the animal is collected for the NYS Museum in accordance with the NYSDEC License to Collect and Possess issued for this work (NYSDEC LCP#1555).

If less than 20 mussels are present for a species, all will be measured and aged. If more than 20 mussels are found for a species, a subsample of a minimum of 20 individuals per species will be measured and aged. The subsample will include the smallest and largest individuals found to document the maximum and minimum sizes found at each site. The remaining individuals for the subsample should be visually selected in proportion to their representation in the sample. In addition to measurements, each female mussel in the subsample will be examined to determine if the individual is gravid. This will be accomplished by carefully and slowly separating the valves of the mussel until the gill can be seen. Gravid individuals have large inflated gills that can be visually observed through a small opening between the valves. Care must be taken not to damage the valves. If the mussel cannot be opened slightly without damaging the valves, the mussel should not be inspected. Upon completion of all measurements, mussels shall be released at or as close as possible to the site of collection.

The Appendix A data sheet (attached below) has been revised to provide space to collect these new data and to increase the number of individuals measured and examined from five (as approved 2012 QAPP) to the new minimum of 20 individuals per species (where available).

## **Section 9.0 SAMPLE HANDLING AND CUSTODY REQUIREMENTS**

There will be no sample collection for the Freshwater Mussel Survey.

Mussels collected temporarily for measurement, photographs, and examination will be kept in a bucket of river water except during the actual sorting by species and size, examination or taking of photographs. Mussels will not be held out of water so long as to cause injury. After examination, mussels will be released as close to the point of collection as possible.

## **Section 10.0 ANALYTICAL METHODS REQUIREMENTS**

There are no analytical methods proposed for the Freshwater Mussel Survey Efforts.

## **Section 11.0 QUALITY CONTROL REQUIREMENTS**

Dr. J. Mark Erickson, recognized mussel identification expert, will be on-site to identify, age, and sex all mussels. Mussels will be aged by counting the annual growth rings on the outside of the shell. Erickson has over 30 years experience identifying and aging mussels and has compared his external growth ring counts with microscopic examination of radial thin sections of the same individual mussel shells to perfect his technique. A minimum of 25% of mussels aged will be aged by two observers. If the second observer estimates a different age, the mussel will be reexamined by both observers until consensus can be reached. If consensus cannot be reached, Erickson will determine the age, or the mussel will be excluded from the analysis. For specimens with erosion of the umbo, the number of missing rings will be estimated based on known age specimens at the same site or on Erickson's professional judgment. All individuals identified as gravid will be checked by a second observer to confirm that the individual is indeed gravid.

## **Section 12.0 INSTRUMENT/EQUIPMENT TESTING INSPECTION AND MAINTENANCE REQUIREMENTS**

No change.

## **Section 13.0 INSTRUMENT CALIBRATION AND FREQUENCY**

No change.

## **Section 14.0 INSPECTION/ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES**

No change.

## **Section 15.0 DATA ACQUISITION REQUIREMENTS**

Secondary, unpublished data on species presence, measurements and age will be provided by Erickson. These data will provide a baseline with which to compare current species distributions, ages, and sizes. Erickson collected mussel data for over two decades in the watersheds of these rivers. These are the only

known published or unpublished data available for the St. Regis River, Raquette River, and lower Grasse River. There are no other available or comparable data for these river reaches known. Because Erickson's data were not collected under a formal Quality Assurance Project Plan, a note to this effect will be inserted in to the status report.

#### **Section 16.0 DATA MANAGEMENT**

No change.

#### **Section 17.0 ASSESSMENTS & RESPONSE ACTIONS**

No change.

#### **Section 18.0 REPORTS TO MANAGEMENT**

Final reporting on these freshwater mussel surveys will be included in a Freshwater Mussel Status Report scheduled to be delivered to the SRMT Program Manager by April 1, 2014.

#### **Section 19.0 DATA REVIEW, VALIDATION, AND VERIFICATION REQUIREMENTS**

No change.

#### **Section 20.0 VALIDATION AND VERIFICATION METHODS**

Dr. J. Mark Erickson, recognized mussel identification expert, will be on-site to identify, age, and sex all mussels.

#### **Section 21.0 RECONCILIATION WITH DATA QUALITY OBJECTIVES**

No change.

## LITERATURE CITED

- Erickson, J.M. and A. R. Fetterman. 1996. The Unionacean fauna of the Grass River Drainage, St. Lawrence County, New York, *In* Roger D. Needham and E. N. Kovakowski, Editors, Sharing Knowledge, Linking Sciences: An International Conference on the St. Lawrence Ecosystem, Conference Proceedings. 1:211-223.
- Normandeau Associates. 2008. Baseline investigation on the freshwater mussels (Unionidae) of the Grasse River, St. Lawrence County, New York. Final Report, October 2008, prepared for Parsons Brinckerhoff and the Massena Electric Department, Massena, New York.
- Riveredge Associates. August 2012 (Revised Final January 2013). Quality Assurance Project Plan for Qualitative Freshwater Mussel Surveys and Mussel Habitat Characterizations. Prepared for St. Regis Mohawk Tribe Environment Division and U.S. EPA Region 2. (GL-97221310-0).
- Riveredge Associates. 2013 (in review). Freshwater Mussel Interim Status Report. Draft report submitted to St. Regis Mohawk Tribe for Avian Habitat, Populations, Reproduction and Contaminants In and Adjacent to the Massena/Akwesasne Area of Concern: Beneficial Use Impairment Advancements for the Massena/Akwesasne Area of Concern on the St. Lawrence River (GL-9722130-10).

## Appendix A. Field Data Sheet

The field data sheet below has been amended to include the new data being acquired during 2013 surveys.

**2013 FIELD DATA SHEET FOR MUSSEL SURVEYS**

Sheet \_\_\_\_ of \_\_\_\_

Date:

Time:

Crew:

Site Description:

Location Code: River \_\_\_\_\_ Section \_\_\_\_\_ Segment \_\_\_\_\_ Month \_\_\_\_ Yr \_\_\_\_  
RR, GR, SR, SL U or D Number

GPS Location (in decimal degrees): Lat: \_\_\_\_\_ Long: \_\_\_\_\_

Substrate Percent Composition:

Silt \_\_\_\_\_ Sand \_\_\_\_\_ Gravel \_\_\_\_\_ Cobble \_\_\_\_\_ Boulder \_\_\_\_\_ Bedrock \_\_\_\_\_

Substrate Stability \_\_\_\_\_ Flow \_\_\_\_\_

Water depth (meters): Maximum \_\_\_\_\_ Minimum \_\_\_\_\_ Average \_\_\_\_\_

Probability Ranking (circle): HIGH MODERATE LOW

[High: live/FD, stable substrate; Moderate: FD, stable substrate; Low: no mussels, unstable/poor substrate]

Collection Method	Search Time (Minutes)	No. of Divers, Snorkelers, Searchers or Samples	Total Search Time (hours) or Samples	Notes
Scuba				
Snorkel				
View scope				
Other?				

Species Found

N	Species and Number of Individuals of Each Species Found	Live	Dead
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Total Number of Live Mussel Species	Total Number of Live Individuals	Total Search Time	Mussels per Search Hour

Form completed by:  
(Initials and date)

Form verified by:

Form completed by:

Form verified by:

Page \_\_\_\_ of \_\_\_\_

Site description:

	Species	Sex	Length (mm)	Height (mm)	Width (mm)	Age (yrs)	Notes (gravid?)
1							
2							
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